

WHAT IS CLAIMED IS:

1. An image encoding device, comprising:

a transformation component for converting an image into transformation coefficients by subjecting said image to a frequency decomposition, said image having an area;

a dividing component for dividing said transformation coefficients produced by said transformation component into a selected region and a non-selected region on said image, said non-selected region being an area of said image other than an area defined by said selected region;

an encoding component for encoding said transformation coefficients by allocating a greater quantity of information to said selected region than to said non-selected region; and

a region adjustment component for controlling a bit allocation rate of said non-selected region by adjusting the area of said selected region, the bit allocation rate being a mean amount of code per unit area.

2. The image encoding device according to claim 1, wherein

said region adjustment component adjusts the area of said selected region by taking into account:

a bit allocation rate of said image as a whole;

a bit allocation rate of said selected region; and

the bit allocation rate of said non-selected region, and

wherein, each of the bit allocation rates is determined in advance as a target value.

3. The image encoding device according to claim 1, wherein

said region adjustment component adjusts the area of said selected region by taking into account:

a bit allocation rate of said image as a whole;

a bit allocation rate of said selected region; and

a ratio of the bit allocation rate of said selected region to the bit allocation rate of said non-selected region, and

wherein, each of the bit allocation rates and the ratio are determined in advance as target values.

4. The image encoding device according to claim 2, wherein

said region adjustment component determines an adjustment value of the area of said selected region by substituting said target values into the following general calculation equation:

$$\gamma_{\text{total}} = \gamma_{\text{roi}} \times A_{\text{roi}} + \gamma_{\text{notroi}} \times (1 - A_{\text{roi}}),$$

where, γ_{total} is the bit allocation rate of said image as a whole, γ_{roi} is the bit allocation rate of said selected region, A_{roi} is a proportion of the area of said image as a whole that is occupied by said selected region, and γ_{notroi} is the bit allocation rate of said non-selected region, and solving said equation.

5. The image encoding device according to claim 4, wherein

said region adjustment component limits the adjustment value of the area of said selected region by at least a pre-determined upper-limit value or a pre-determined lower-limit value.

6. An image encoding device, comprising:

a transformation component for converting an image into transformation coefficients by subjecting said image to a frequency decomposition, said image having an area;

a dividing component for dividing said transformation coefficients produced by said transformation component into a selected region and a non-selected region on said image, said non-selected region being an area of said image other than an area defined by said selected region;

an encoding component for encoding said transformation coefficients by allocating a greater quantity of information to said selected region than to said non-selected region; and

a region adjustment component for controlling a bit allocation rate of said non-selected region by adjusting a bit allocation rate of said selected region.

7. The image encoding device according to claim 6, wherein

said region adjustment component adjusts the bit allocation rate of said selected region by taking into account:

a bit allocation rate of said image as a whole;

the area of said selected region; and

the bit allocation rate of said non-selected region, and

wherein, each of the bit allocation rates and the area are determined in advance as target values.

8. The image encoding device according to claim 6, wherein

said region adjustment component adjusts the bit allocation rate of said selected region by taking into account:

a bit allocation rate of said image as a whole;

the area of said selected region; and

a ratio of the bit allocation rate of said selected region to the bit allocation rate of said non-selected region, and

wherein, the bit allocation rate of said image as a whole, the area of said selected region and the ratio are determined in advance as target values.

9. The image encoding device according to claim 7, wherein

said region adjustment component determines an adjustment value of the bit allocation rate of said selected region by substituting said target values into the following general calculation equation:

$$\gamma_{\text{total}} = \gamma_{\text{roi}} \times \text{Aroi} + \gamma_{\text{notroi}} \times (1 - \text{Aroi}),$$

where, γ_{total} is the bit allocation rate of said image as a whole, γ_{roi} is the bit allocation rate of said selected region, Aroi is a proportion of the area of said image as a whole that is occupied by said selected region, and γ_{notroi} is the bit allocation rate of said non-selected region, and solving said equation.

10. The image encoding device according to claim 9, wherein

said region adjustment component limits the adjustment value of the bit allocation rate of said selected region by at least a pre-determined upper-limit value or a pre-determined lower-limit value.

11. An image encoding device, comprising:

a transformation component for converting an image into transformation coefficients by subjecting said image to a frequency decomposition;

a dividing component for dividing said transformation coefficients produced by said transformation component into a selected region and a non-selected region on said image, said non-selected region being an area of said image other than an area defined by said selected region;

an encoding component for encoding said transformation coefficients by allocating a greater quantity of information to said selected region than to said non-selected region, wherein said encoding component encodes said transformation coefficients while gradually increasing allocation of a quantity of information from a peripheral part of said selected region toward a central part of said selected region; and

a region adjustment component for controlling a bit allocation rate of said non-selected region by adjusting a slope of increase of said allocation.

12. An image encoding device, comprising:

a transformation component for converting an image into transformation coefficients by subjecting said image to a frequency decomposition;

a dividing component for dividing said transformation coefficients produced by said transformation component into a selected region and a non-selected region on said image, said non-selected region being an area of said image other than an area defined by said selected region;

an encoding component for encoding said transformation coefficients by allocating a greater quantity of information to said selected region than to said non-selected region, wherein

said encoding component encodes said transformation coefficients while gradually increasing allocation of a quantity of information from a peripheral part of said selected region toward a central part of said selected region; and

a region adjustment component for controlling a bit allocation rate of said non-selected region by adjusting a maximum value of a bit allocation rate of said selected region.

13. An image encoding device, comprising:

a transformation component for converting an image into transformation coefficients by subjecting said image to a frequency decomposition;

a region adjustment component for detecting a region of focus on said image and for determining a selected region on said image on the basis of said region of focus;

a dividing component for dividing said transformation coefficients produced by said transformation component into said selected region and a non-selected region on said image, said non-selected region being an area of said image other than an area defined by said selected region; and

an encoding component for encoding said transformation coefficients by allocating a greater quantity of information to said selected region than to said non-selected region.

14. An image encoding device, comprising:

a transformation component for converting an image into transformation coefficients by subjecting said image to a frequency decomposition;

a dividing component for dividing said transformation coefficients produced by said transformation component into a selected region and a non-selected region on said image, said

non-selected region being an area of said image other than an area defined by said selected region;

an encoding component for encoding said transformation coefficients by allocating a greater quantity of information to said selected region than to said non-selected region; and

a region adjustment component for detecting a region of focus on said image and for displacing said selected region in direction of said region of focus.

15. An image encoding device, comprising:

a transformation component for converting an image into transformation coefficients by
subjecting said image to a frequency decomposition;

a region adjustment component for receiving an input indicating a selected region on said image and for setting said selected region in accordance with said input;

a dividing component for dividing said transformation coefficients produced by said transformation component into said selected region and a non-selected region on said image, said non-selected region being an area of said image other than an area defined by said selected region; and

an encoding component for encoding said transformation coefficients by allocating a greater quantity of information to said selected region than to said non-selected region.

16. An electronic camera, comprising:

an image encoding device, comprising:

a transformation component for converting an image into transformation coefficients by subjecting said image to a frequency decomposition, said image having an area;

a dividing component for dividing said transformation coefficients produced by said transformation component into a selected region and a non-selected region on said image, said non-selected region being an area of said image other than an area defined by said selected region;

an encoding component for encoding said transformation coefficients by allocating a greater quantity of information to said selected region than to said non-selected region; and

a region adjustment component for controlling a bit allocation rate of said non-selected region by adjusting the area of said selected region, the bit allocation rate being a mean amount of code per unit area, and
an imaging component for imaging an object and producing image data, wherein said image encoding device encodes said image data produced by said imaging component.

17. A computer, comprising:

an image encoding program which allows the computer to function as:

a transformation component for converting an image into transformation coefficients by subjecting said image to a frequency decomposition, said image having an area;

a dividing component for dividing said transformation coefficients produced by said transformation component into a selected region and a non-selected region on said

image, said non-selected region being an area of said image other than an area defined by said selected region;

an encoding component for encoding said transformation coefficients by allocating a greater quantity of information to said selected region than to said non-selected region; and

a region adjustment component for controlling a bit allocation rate of said non-selected region by adjusting the area of said selected region, the bit allocation rate being a mean amount of code per unit area, and

a machine-readable recording medium for recording said image encoding program.

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18. A method of encoding an image, comprising the steps of:

converting an image into transformation coefficients by subjecting said image to a frequency decomposition, said image having an area;

dividing said transformation coefficients into a selected region and a non-selected region on said image, said non-selected region being an area of said image other than an area defined by said selected region;

encoding said transformation coefficients by allocating a greater quantity of information to said selected region than to said non-selected region; and

controlling a bit allocation rate of said non-selected region by adjusting the area of said selected region, the bit allocation rate being a mean amount of code per unit area.

19. The method according to claim 18, further comprising the step of:

adjusting the area of said selected region by taking into account:

a bit allocation rate of said image as a whole;
a bit allocation rate of said selected region; and
the bit allocation rate of said non-selected region,

wherein, each of the bit allocation rates is determined in advance as a target value.

20. The method according to claim 18, further comprising the step of:

adjusting the area of said selected region by taking into account:

a bit allocation rate of said image as a whole;
a bit allocation rate of said selected region; and

a ratio of the bit allocation rate of said selected region to the bit allocation rate of
said non-selected region,

wherein, each of the bit allocation rates and the ratio are determined in advance as target

values.

21. The method according to claim 19, further comprising the steps of:

determining an adjustment value of the area of said selected region by substituting said
target values into the following general calculation equation:

$$\gamma_{\text{total}} = \gamma_{\text{roi}} \times A_{\text{roi}} + \gamma_{\text{notroi}} \times (1 - A_{\text{roi}}),$$

where, γ_{total} is the bit allocation rate of said image as a whole, γ_{roi} is the bit allocation rate of
said selected region, A_{roi} is a proportion of the area of said image as a whole that is occupied by
said selected region, and γ_{notroi} is the bit allocation rate of said non-selected region, and
solving said equation.

22. The method according to claim 21, further comprising the step of:

limiting the adjustment value of the area of said selected region by at least a pre-determined upper-limit value or a pre-determined lower-limit value.

23. A method of encoding an image, comprising the steps of:

converting an image into transformation coefficients by subjecting said image to a frequency decomposition, said image having an area;

dividing said transformation coefficients into a selected region and a non-selected region on said image, said non-selected region being an area of said image other than an area defined by said selected region;

encoding said transformation coefficients by allocating a greater quantity of information to said selected region than to said non-selected region; and

controlling a bit allocation rate of said non-selected region by adjusting a bit allocation rate of said selected region.

24. The method according to claim 23, further comprising the step of:

adjusting the bit allocation rate of said selected region by taking into account:

a bit allocation rate of said image as a whole;

the area of said selected region; and

the bit allocation rate of said non-selected region,

wherein, each of the bit allocation rates and the area are determined in advance as target values.

25. The method according to claim 23, further comprising the step of:

adjusting the bit allocation rate of said selected region by taking into account:

a bit allocation rate of said image as a whole;

the area of said selected region; and

a ratio of the bit allocation rate of said selected region to the bit allocation rate of said non-selected region,

wherein, the bit allocation rate of said image as a whole, the area of said selected region and the ratio are determined in advance as target values.

26. The method according to claim 24, further comprising the steps of:

determining an adjustment value of the bit allocation rate of said selected region by

substituting said target values into the following general calculation equation:

$$\gamma_{\text{total}} = \gamma_{\text{roi}} \times \text{Aroi} + \gamma_{\text{notroi}} \times (1 - \text{Aroi}),$$

where, γ_{total} is the bit allocation rate of said image as a whole, γ_{roi} is the bit allocation rate of said selected region, Aroi is a proportion of the area of said image as a whole that is occupied by said selected region, and γ_{notroi} is the bit allocation rate of said non-selected region, and solving said equation.

27. The method according to claim 26, further comprising the step of:

limiting the adjustment value of the bit allocation rate of said selected region by at least a pre-determined upper-limit value or a pre-determined lower-limit value.

28. A method of encoding an image, comprising the steps of:

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converting an image into transformation coefficients by subjecting said image to a frequency decomposition;

dividing said transformation coefficients into a selected region and a non-selected region on said image, said non-selected region being an area of said image other than an area defined by said selected region;

encoding said transformation coefficients by allocating a greater quantity of information to said selected region than to said non-selected region, wherein said transformation coefficients are encoded while allocation of a quantity of information from a peripheral part of said selected region toward a central part of said selected region is gradually increased; and

controlling a bit allocation rate of said non-selected region by adjusting a slope of increase of said allocation.

29. A method of encoding an image, comprising the steps of:

converting an image into transformation coefficients by subjecting said image to a frequency decomposition;

dividing said transformation coefficients into a selected region and a non-selected region on said image, said non-selected region being an area of said image other than an area defined by said selected region;

encoding said transformation coefficients by allocating a greater quantity of information to said selected region than to said non-selected region, wherein said transformation coefficients are encoded while allocation of a quantity of information from a peripheral part of said selected region toward a central part of said selected region is gradually increased; and

controlling a bit allocation rate of said non-selected region by adjusting a maximum value of a bit allocation rate of said selected region.

30. A method of encoding an image, comprising the steps of:

converting an image into transformation coefficients by subjecting said image to a frequency decomposition;

detecting a region of focus on said image;

determining a selected region on said image on the basis of said region of focus;

dividing said transformation coefficients into said selected region and a non-selected region on said image, said non-selected region being an area of said image other than an area defined by said selected region; and

encoding said transformation coefficients by allocating a greater quantity of information to said selected region than to said non-selected region.

31. A method of encoding an image, comprising the steps of:

converting an image into transformation coefficients by subjecting said image to a frequency decomposition;

dividing said transformation coefficients into a selected region and a non-selected region on said image, said non-selected region being an area of said image other than an area defined by said selected region;

encoding said transformation coefficients by allocating a greater quantity of information to said selected region than to said non-selected region;

detecting a region of focus on said image; and

displacing said selected region in direction of said region of focus.

32. A method of encoding an image, comprising the steps of:

converting an image into transformation coefficients by subjecting said image to a frequency decomposition;

receiving an input indicating a selected region on said image;

setting said selected region in accordance with said input;

dividing said transformation coefficients into said selected region and a non-selected region on said image, said non-selected region being an area of said image other than an area defined by said selected region; and

encoding said transformation coefficients by allocating a greater quantity of information to said selected region than to said non-selected region.

33. A method of encoding an image in an electronic camera, comprising the steps of:

imaging an object, thus producing an image having an area;

producing image data from said image; and

encoding said image data by:

converting said image data into transformation coefficients by subjecting said image data to a frequency decomposition;

dividing said transformation coefficients into a selected region and a non-selected region of said image, said non-selected region being an area of said image other than an area defined by said selected region;

encoding said transformation coefficients by allocating a greater quantity of information to said selected region than to said non-selected region; and
controlling a bit allocation rate of said non-selected region by adjusting the area of said selected region, the bit allocation rate being a mean amount of code per unit area.

34. A method of encoding an image on a computer, comprising the step of:

recording an image encoding program on the computer, thus allowing the computer to:

convert an image into transformation coefficients by subjecting said image to a frequency decomposition, said image having an area;

divide said transformation coefficients into a selected region and a non-selected region on said image, said non-selected region being an area of said image other than an area defined by said selected region;

encode said transformation coefficients by allocating a greater quantity of information to said selected region than to said non-selected region; and

control a bit allocation rate of said non-selected region by adjusting the area of said selected region, the bit allocation rate being a mean amount of code per unit area.

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